

MINISTRY OF AGRICULTURE AND FISHERIES OF  
THE UNITED KINGDOM  
Grain Drying and Storage in Great Britain

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Grain drying and...



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MINISTRY OF AGRICULTURE AND FISHERIES

# Grain Drying and

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by the Government and  
people of  
the United Kingdom  
under the  
Technical Co-operation  
Scheme  
of  
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5. At the outset we wish to emphasize the very wide margin of error of many of the estimates used. This applies more particularly to farming operations where the number of separate units and the diversity of farming practice makes close estimating impossible. Our greatest difficulty arose in assessing the average acreage of corn cut by each combine harvester (of a given width of cut). This varies considerably with the district and the season ; it is affected by the weather and the practice in the area concerned in regard to hiring from contractors and the lending of machines to neighbours. For example, uniformly good weather allows increased working of individual machines in spite of a shorter period of operation ; the increasing costs of labour required for stooking and stacking and of binder twine are factors tending in the same direction. On the other hand some farmers are becoming more careful in selecting crops to be cut by combine or are acquiring a second combine in order to choose their cutting times with greater precision and avoid the drying problem ; some also prefer to stack crops they are retaining for feed. Furthermore, as numbers of combines increase a higher proportion is going onto farms with small grain acreages so that many must be worked far below capacity. It seems to us impossible to take any dogmatic view of the net effect of these factors in future years and the only course open to us was to start from an assessment of average 1950 practice throughout the country and adopt a range of variation in drawing a picture of the future.

## Section 2. Farm Operations

The result of our calculations on farm operations with notes on the sources of information and approximations used, is appended (Appendix I, Table 1).

6. *1950 Harvest.* Of a total production of grain in 1950 of 7,000,000 tons, we estimate that 1,900,000 tons was cut by combine, and say 200,000 tons threshed by traditional methods in the first ten weeks. Oats and dredge corn have been included in the calculation because these are being harvested by combine in small but increasing quantities ; the bulk of the grain combined consists of wheat and barley. Subtracting the total known to have left farms in the ten weeks beginning August 7 1950, i.e., 1,500,000 tons, it appears that about 600,000 tons of grain had not yet been disposed of at the end of the ten weeks. This would include permanent retentions for feeding purposes, especially oats and barley, and for seed ; it would also include quantities of grain in transit or held temporarily in improvised storage in certain districts pending dispatch to merchants, and also a certain amount which at mid-October was being dried by merchants, on behalf of farmers without having been entered as a merchant's receipt, in addition to whatever quantity was held by farmers fully equipped with storage and drying plant.

7. In 1950, of course, the proportion of grain requiring treatment before storage was unusually high but the above result is at least not inconsistent with the response to a special inquiry on farm drying capacity arranged by the Working Party, and addressed to farmers known to possess drying plants (including platform sack driers, etc.), which indicated that some 300-350,000 tons of grain was actually dried on farms in 1950. If our analysis is correct, a fairly large proportion of the total of some 600,000 tons of grain held on farms in various forms of temporary and permanent storage at mid-October 1950 cannot have been mechanically dried. Some of this had deteriorated by the time it was marketed. We note in passing that this type of season is not necessarily the most difficult from the point of view of buyers because the abnormal extension of the harvest period resulted in the disposals off the farm being spread over a much longer period than would otherwise be the case.

**8. Future Combine Harvester Numbers.** In forming a picture of the position in 1952 we have thought it right to assume that all combine harvesters which the manufacturers are planning to produce by the 1952 harvest will in fact be sold, i.e., there will be 6,000 more combines in operation than there were in 1950. The number of combines in use by the 1952 harvest may seem high but, although the geographical distribution of purchasers of new combines is changing slightly from the east to the west of the country, there is no sign that saturation point is being reached in the country as a whole. We are also assuming that although new machines are not as yet to any material extent required as replacements for worn-out machines, this factor will probably arise in 1952 (say to the extent of 500 machines) and will become important in future years. The demand for new machines is likely to slacken off in the eastern counties at no very distant date; on the other hand there would be a demand for the production in quantity of a cheaper small-size machine with 5 ft. or 6 ft. cut, adding greatly to the numbers of potential combine users in the western districts of Great Britain. Altogether we anticipate a continued increase in combine numbers in use in the years after 1952 but at a diminishing rate.

**9. Additional Farm Facilities.** It is impossible to make any precise forecast of developments in farm drying and storage in the next few years and we can do no more than record three important factors in the situation:

- (a) On the one hand there are signs of hesitation on the part of farmers in undertaking the necessary outlay for complete mechanical drying installations and bulk storage for their combined grain. At the same time there is a growing demand for the less expensive types of drying equipment being developed by the National Institute of Agricultural Engineering and others.
- (b) Next there is the general tendency of farmers, whether equipped with storage and drying facilities or not, to try to get any grain that is *intended for sale* away from the farm as soon as possible. This arises partly from a need for immediate cash and partly because, in spite of the seasonal price scale for wheat and the existence of a wide range between the effective upper and lower prices for feeding barley, many farmers believe that the financial advantage of holding off the market in the glut period is outweighed by the loss from selling a reduced weight of grain which has been dried down to a safe storage figure.
- (c) A third factor of growing importance, however, is the tendency of farmers to retain more of their grain for feeding purposes, especially in the light of the increased prices for purchased feedingstuffs.

### Section 3. Disposal of Wheat

**10.** This section deals with wheat received direct by millers, that is, not through national silos or the Ministry of Food. Intake by flour millers in the ten-week period of 1950 at 528,000 tons was unusually high. Of this total 400,000 tons was the usage of British wheat in the grist in that period, and is the maximum which for all practical purposes can be absorbed. Any increase, therefore, in the processor's intake in that period beyond 528,000 tons could not be offset by higher usage, and could only be increased to say 550,000 tons if stocks held by millers were increased to the limit of the storage available.

**11.** It is important to realize that although flour millers assume responsibility for conditioning their total intake of home-grown wheat, mechanical drying is applied to only a small proportion of it. Such proportion of the intake as is not processed immediately represents wheat which is capable

of being held for a limited period without danger of deterioration. In a very wet season flour millers might have to reduce the stock carried over and there might also be some difficulty in maintaining the usage of home-grown wheat at 400,000 tons during the first ten weeks of the harvest.

**12.** The position has been examined region by region but no outstanding differences in the availability of facilities were apparent—except that intake facilities for wheat fall short in the north-west of England. The mills there were originally equipped to take imported wheat and their siting does not permit much development of intake facilities on the land side.

**13.** Before the harvest of 1952, flour millers might provide another 10-20,000 tons of storage, but, as already pointed out, the limit of usage of home-grown wheat in the bread flour grist at the present rate of consumption and extraction during the peak period of wheat marketing was probably reached in 1950. Biscuit flour millers who operate on an all-home-grown wheat grist also take in as much wheat as they can accommodate in this period. The heavy pressure of home-grown wheat on the mills in the relatively short period following harvest causes a number of difficult handling and production problems. (In seasons when the moisture of the grain is above average or the quality otherwise impaired, the need to use up quickly large quantities of such grain seriously aggravates the difficulties.) Moreover, a great deal of uneconomic movement of wheat takes place unavoidably as the port mills fill up with home-grown wheat—storage space which would otherwise be available for imported wheat—and more of the latter has to be moved inland for storage than would be the case if the flow of home-grown wheat to the mills was spread out over a longer period.

#### **Section 4. Disposal of Barley**

**14.** In 1950 about 600,000 tons of barley were sold off farms in the first ten weeks of harvest. The actual intake by provender millers and compounders was 100,000 tons—all that farmers offered—and the intake of maltsters, brewers and distillers was 380,000 tons. The Ministry of Food took 20,000 tons off the market and the balance of 100,000 tons (except for about 10 per cent in transit) was held by merchants for ultimate disposal for malting, seed or feed. In 1951 about the same quantity of barley was bought by approved buyers but within the total of a little over 600,000 tons the intake of maltsters, brewers and distillers increased to 520,000 tons during the ten weeks while only 3,000 tons was offered to provender millers and compounders, and none to the Ministry of Food. The bulk of the remainder was held by merchants. The possibility of larger quantities being absorbed is considered below.

**15.** So far as the processors are concerned the maltsters, brewers and distillers estimated early in 1951 that their maximum intake capacity for the first ten weeks of harvest, assuming a normal carry-over from the previous year, was 433,000 tons, that is some 50,000 tons more than they actually took in the corresponding period of 1950. These processors also had 60,000 tons storage beyond this but some improvement of intake facilities would be needed before it could be used during the harvest period.

**16.** For the 1951 harvest the maltsters and brewers expected to have provided a further 17,000 tons of intake and storage while the merchants were expected to have provided a further 19,000 tons. Thus there appear to have been facilities for handling 36,000 tons more in 1951 than in the previous season and no doubt intake facilities were provided during 1951 for a part of the 60,000 tons of surplus storage referred to in the previous paragraph. After making full allowance for all these factors, it is clear that

maltsters, brewer maltsters and distillers achieved a very high intake in the harvest period of 1951 and this seems to have been possible only because they began the season with an exceptionally low carry-over both of barley and malt. This enabled them in 1951 to use for the intake of new season's barley, labour which would normally be engaged on the malting process and storage which would normally be in use for the carry-over of barley and malt from the previous season. On the basis of this season's experience we should regard about 500,000 tons as being the present maximum intake capacity of maltsters, brewer maltsters and distillers during the first ten weeks of a normal season.

17. We have been told that for 1952 the maltsters and brewers plan to provide a further additional 38,000 tons of storage and the provender millers an additional 7,000 tons. The merchants have a provisional estimate of 16,000 tons but this is subject to the provision of reasonable incentives and, in view of withdrawal of the initial allowance income tax concession in the 1951 Budget, much of the 16,000 tons may not be provided for after all. Subject to this reservation however there should be provided for 1952, or shortly after, some 96,000 tons more storage beyond that provided in 1950. This figure is, however, the maximum unless maltsters improve their intake facilities to enable them to use during the peak period the whole of their 60,000 tons storage that was surplus in 1950 or unless they again begin the buying season with exceptionally small carry-over stocks.

18. In addition, by using a larger proportion of home-grown barley in compound feedingstuffs—as they have done in certain previous years—compounders could take in an additional 100,000 tons if necessary. These supplies would only be available to the compounders if the pressure of barley on the market was such that barley was on offer at the feeding range of prices. This is unlikely when, as in 1950 and 1951, the demand during the ten weeks period for barley for malting and distilling is sufficient to absorb at higher prices the whole supply on offer.

## Section 5. Disposal of Oats

19. In the 1950 harvest period oatmeal millers took 62,000 tons and provender millers 40,000, leaving 15,000 in merchants' hands or in transit (of which 10,000 tons was returned to growers as seed). Oatmeal millers can be expected to be able to handle any oats they wish to accept in future, their intake being limited solely by the amounts they can sell as oat products. Their capacity is at least equivalent to their 1949 intake of 73,000 tons since during the war they took even larger quantities, all of which—however threshed—would need drying before it could be dehusked. Provender millers will also be able to deal with what they wish to take. Sales will be limited by the fact that in England and Wales oats are primarily a crop retained on the farm for feeding, not by any limitations in users' facilities to accept offers

## Section 6. Storage provided by Ministry of Food (including Re-Commissioned Mills Ltd.)

20. In the first ten harvest weeks of 1950 Re-Commissioned Mills Ltd. (a company wholly owned by the Ministry of Food) and the Ministry of Food stores took in 125,000 tons of wheat and 20,000 tons of barley.

21. The policy of the Ministry for the 1951 harvest was to have sufficient storage space available to enable the drying facilities of Re-Commissioned Mills Ltd. to be used, if the need arose, to maximum capacity. New silos and an extension to an existing silo built for Re-Commissioned Mills Ltd. provided a further 9,000 tons of storage space, making 86,000 tons of silo

storage space in all. In addition storage was earmarked in existing general-purpose stores to the extent of 133,000 tons. Owing to the decline in sales of grain off farms in 1951 compared with 1950, much of the space available was not needed and was released for other purposes as the harvest progressed.

22. Except for two silos not completed in time for the 1951 harvest which will provide 5,000 tons extra storage, the Ministry aim to provide the same drying and storage facilities for home-grown grain from the 1952 harvest as for 1951. There should therefore be 5,000 tons more Ministry storage available for 1952 than was available for 1951, making 224,000 tons in all.

## Section 7. Conclusions

23. *1951 Harvest.* Although time has not permitted us to make a considered assessment of the 1951 harvest, we thought it right not only to record our general impressions but also to include an approximate calculation. Conditions were so different from 1950, however, that direct comparisons with that year have very limited value. Owing to uneven ripening of crops many farmers reverted in part to cutting by binder. Hence—with due allowance for fairly heavy threshings from the field or after a short period in stack—the increased numbers of combines was offset by an abnormally low usage per machine. Sales off farms in the ten weeks of the harvest (a later ten weeks than in 1950) were less in 1951 than in the previous year and generally speaking this appears to have been the result of lack of offers by farmers rather than difficulty in moving the grain.

24. Many farmers were evidently prepared unwisely to hold grain off the market without being equipped to dry it properly, often using unsatisfactory improvised storage. This is borne out by the reported pressure on farmers' driers and considerable congestion at other driers which dried farmers' grain and by the fact that some of the combined grain coming forward in November and December was reported to be in a very poor condition.

25. We had anticipated that in 1951 the reduced grain acreage and prolonged sowing season would result at harvest time in a reduced use of combines over a longer period which would put this year's experience out of line with the general development. But after the event it seems to us that two of the factors noticed may have some permanent effect—the practice of purchasing a combine as a reserve machine on large farms, and the use of the binder instead of a combine for the sake of preserving the straw.

26. *1952 and later Harvests.* Our forecast of the coming harvest is briefly this. Probably some 6,000 more combine harvesters will be on farms than in 1950. It is quite impossible to assess with any precision the corresponding extra quantity of combined grain. We can only say that, according to the harvest weather and other circumstances of the season the *additional* quantity of threshed grain to be disposed of in the ten harvest weeks of 1952, compared with our base year 1950 may be negligible, or it may be as much as 1,200,000 tons. Of this, the merchants, processors and the Ministry of Food should be able to absorb 300,000 tons more (or in certain circumstances 400,000 tons). We are left with the possibility of a deficiency of anything up to 900,000 tons less whatever fresh drying and storage capacity is added on farms. The deficiency whatever it may be will be affected by the extent to which it continues to be profitable for farmers to retain their own grain for feeding rather than to purchase feedingstuffs. (Calculations on the disposal of grain in 1950 and 1951 with a rough forecast for 1952 are appended in Appendix I, Table 2.)

27. Data of sales of drying plants of various kinds have been examined and, while they cannot form the basis of a reliable estimate of new drying capacity, they indicate that not more than about 1 in 10 of the purchasers of combines are at the same time purchasing a recognized type of drier. Some of course already have access to driers but it is clear that the number of combines continues to outstrip the number of driers needed.

28. The rate of additions to permanent storage on farms is still less capable of measurement. But with full allowance for new purchases and for the scope for stretching the capacity of drying plant and storage on farms—in the way it evidently has been stretched for instance in 1951—it is quite clear to us that the facilities must come very far short of being able to deal with the problem that would arise if the upper limit of our calculations proves to be the relevant figure in 1952.

29. We have shown that a precise forecast for a particular year is impossible. No problems may arise for instance in 1952. But there is an overwhelming probability that conditions appropriate to maximum combine usage e.g., a quick though broken harvest accompanied by high yields will arise at least once over a short term of years. In that event a serious situation will develop. And if it is delayed beyond 1952 the size of the problem will be increased because of the upward trend in combined grain matched by a disproportionately small provision of storage and new drying plant on farms and insufficient additions to intake facilities elsewhere. Already a fair amount of grain is damaged in a wet harvest and in any year from 1952 onwards this damage may become widespread and serious from the national point of view. Action is therefore urgently required in the following directions:

A greater rate of installation of drying plants and storage on farms.

Increased intake, drying and storage capacity by merchants and processors, involving a corresponding increase in the physical movement of grain.

## Part II. Remedies

### General

30. We now proceed to examine various suggestions for dealing with the problem which is disclosed by Part I of the Report. We have received written evidence from, or held discussions with, the various organizations concerned with home-grown grain. These are mentioned in Appendix III. We have also given close consideration to the report of a mission, composed in part of some members of the Working Party, which visited the United States of America during July and August last under the auspices of the Economic Co-operation Administration for the specific purpose of studying the methods adopted in the U.S.A. for the handling and storage of grain\*. As will appear later, we are of the opinion that a number of the mission's recommendations could be adopted with advantage in this country provided full allowance is made for the different circumstances. Although climatic conditions in America are more favourable for harvesting operations, yet in some States drying of grain is necessary, while the need for storage and for economy in labour in the handling of grain is common to both countries.

\* *Grain Storage Drying and Marketing in the United States of America.* Obtainable from H.M. Stationery Office, price 1s. 6d. (1s. 7½d. by post).

31. It was pointed out by some of our witnesses that since purchases of combines are outstripping the installation of drying and storage facilities on farms one possible course would be the deliberate restriction of purchases of combine harvesters. During part of the war there was, of course, a system of individual control of purchases of imported and some home-produced machinery through County Agricultural Executive Committees. We understand that in connection with the allocation of steel it may be necessary to restore control of production of different types of farm machinery but this would be done through manufacturers and would not involve examination of individual orders from farmers. As the main argument for purchasing a combine is to reduce labour costs it would be difficult in present conditions to suggest any deliberate slowing up of production of combines for the home market. We assume then in this report that farmers will be free to purchase combines if they wish and are able to obtain them.

32. We next considered incentives to increase drying and storage on premises of

- (a) farmers.
- (b) merchants and other intermediaries.
- (c) ultimate users.

Part I of the Report has shown that there is in sight a serious deficiency of facilities, of such a size as to require a combined effort by these three interests. We are not, therefore, placed in the position of having to select one of them as the only one to be encouraged to extend facilities. The most economical siting in a given area would clearly depend very often on local circumstances. It may be useful, however, to record our view that where there is room for the exercise of preference, the siting of storage at the farm or the ultimate users' premises is preferable to siting at intermediate points, *except* where these points are sufficiently near to the farm to receive grain straight from the combine.

The Government grain storage units have the advantage of economic large-scale operation, but against this they are at intermediate points often drawing their grain from a wide area involving double handling. As single purpose enterprises they have a seasonal burst of activity, and they lack the economic advantages of stores belonging to merchants or final users whose grain handling operations are part of a diversified business. We do not, therefore, favour any extension of government stores and regard the problem essentially as one for solution by the farming, commercial and grain-using industries concerned; it will be an encouragement to private operators if they know that the field is left to them.

### Transport and Siting

33. Transport has an important bearing on siting. The railways are primarily concerned with wheat and, to a lesser extent, barley, and with long hauls. The growing compression of the annual grain flow on the railways into a short harvest peak is already causing severe pressure on rolling stock, sacks, and services generally, and is being catered for at the cost of considerable wagon standage. For example, in the dry August and September of 1949 in the L.M. Region alone some 5,000 grain wagons were held up awaiting discharge for periods of over 48 hours, their average standage per wagon being just over 5 days. In the wetter 1950, delays on a somewhat lesser scale continued for a longer period and the average standage increased slightly in October. The hold-up was mainly in the north-west of England but the effect was widespread and eventually caused embargoes on loading. Delays of less than 48 hours were also numerous at many points.

In 1951 the difficulties were less severe and delays less extensive, due partly to the substantially smaller quantity of grain to be handled and partly to the wetter condition of the grain leading to increased employment of road transport.

**34.** The delays described above illustrate that it is the dry season which causes the most congestion on the rail, as the grain flows from the fields in a volume far in excess of users' normal intake capacity. They also show, however, that in any season delays in turn-round are now reaching the point where they must reduce considerably the amount of grain the railways could carry in the crucial period; in a wet season even these shorter delays can seriously affect the condition of the grain carried, as well as impede the free circulation of rolling stock. Although about half a million wagons are normally available for merchandise traffic, during this period large numbers of vehicles are wanted for fruit traffic, and later for sugar beet. There is thus little "slack", and excessive standage in one trade can have repercussions on others over a wide area.

**35.** We were told that the standage in 1949 and 1950 was kept down only by extraordinary effort by those concerned at the point of delivery and on the railways. The railways, therefore, are apprehensive about the increase in sales off farms during the peak period especially in a dry harvest unless the intake facilities of recipients are augmented or speeded.

**36.** The road transport problem is similar. The Road Haulage Executive have informed us that they can safely handle substantial quantities of grain provided it comes forward in a steady flow within the period and is available in 6-15 ton loads. Difficulties would arise under weather conditions which resulted in sudden rushes of offers following spells when the combines could not work, or if large numbers of scattered farmers in remote districts wanted transport at the same time.

### **Farm Drying and Storage**

**37.** We think it would be generally accepted that it would be to the advantage not only of the farmer but also of the transport and some other interests if a substantial part of the additional combined grain could be dried and if possible stored on or very near the farm. Not only is the dispersal of grain desirable from the defence point of view, but a regular marketing of grain in good condition over the season, rather than a concentrated flow of possibly damp grain for a limited period, makes for economic use of transport services and for the minimum loss of grain to the national food supply through deterioration.

**38.** Grain for sale which has been dried at the farm, even if it is sold in the harvest period, can survive any brief delays in transport. But if the transport system or the local stores become choked so that undried grain cannot be taken off the farm serious deterioration and loss may result. When drying is undertaken on the farm it must be in skilled hands, otherwise serious damage may be caused to the inherent suitability of the grain for milling, malting or sowing. If wheat is overheated in the drying process its structure may be damaged to such an extent that even the use of a relatively small proportion in the grist may have a disastrous effect upon the dough-making process and hence on the finished bread. Overheating of barley may similarly destroy its malting properties. Any grain that is overheated is also made unsuitable for use as seed.

39. The combine is now being used to an increasing extent for harvesting feed grain for use on the farm and this is generally most conveniently dried and stored there, although some farmers may prefer to have it dried by a merchant or other local drier.

40. Variations in sizes and types of holdings and the varying uses to which the grain is put complicate the problem of deciding what methods of drying and storage are suitable. And although we have had some years of experience in grain drying on the larger arable farms, the extension of combining to the smaller farms and to the farms where stock is the main interest is a recent development.

41. Special consideration has therefore been given to a number of types of farm drying and storage plants and a Technical Panel convened by Mr. Cashmore at our request has examined different plants and made estimates of the total cost involved. These estimates vary from approximately £400 for a drying unit of the platform type, without storage, installed in an existing barn, to a large-scale dual-purpose grain and grass drier with 10 silos in a new building and a capacity of 4 tons per hour costing about £10,000. We were particularly impressed with the lower-priced platform-type drier which might solve the problem of the smaller farms with upwards of 50 acres of grain, particularly as it can also be used for drying wilted grass earlier in the year and possibly for other green crops, and thereby extend the period of use and reduce the cost of drying grain by spreading the overheads over several crops. The cost of these facilities would, of course, be substantially less on the many farms where buildings which could be adapted for grain storage already exist. Some further information about these plants is given in Appendix II. We cannot too strongly emphasize the importance of cleaning all grain before storage. Precleaning improves the effectiveness of drying and reduces the chance of deterioration in store. Drying and storage plants suitable for merchants' and users' premises are sufficiently well known to the trade and we did not feel called upon to examine them in detail.

42. Owing to climatic conditions drying on the farm is not common in America, but farm storage is well developed and normally takes the form of bins sited outdoors without any covering building. We understand that some farmers are experimenting over here with covered concrete bins without any covering Dutch barn or similar form of building in which to enclose them. This is comparable with American practice and we feel that further experiments with this form of storage would be desirable in the drier parts of the country.

43. We have considered the question whether farmers are aware of the drying and storage equipment at present available. It was suggested to us that there is hesitation in embarking on complete drying and storage installations of the conventional types and that many farmers are adopting a wait-and-see policy until the simpler types recently developed have been tested more thoroughly. On this point we share the view held by the National Farmers' Unions that extended demonstrations of the methods and techniques now available both on a local and possibly a national scale would be useful.

44. We have discussed with the Country Landowners' Association the division of responsibility between landlord and tenant for drying and storage equipment. We understood from them that in the traditional grain growing areas there should be no difficulty in agreement being reached between the two parties; although there is no clear cut dividing line, the normal basis would be that permanent buildings are the landlord's responsibility and movable equipment the tenant's. But there may be some hesitation on the

part of landlords in areas where substantial cereal growing is a recent development. It was therefore suggested to us that in spite of numerous references by Government spokesmen to the need for a continued high level of corn growing in this country, there is need for a Government statement of future cereal policy specifically related to grain storage problems and designed to assure landowners and tenants that they can embark on the necessary outlay with confidence.

**45.** We gathered that if landlords felt a greater sense of security in the future of extensive arable farming, together with some further encouragement by way of more advantageous terms for income tax relief, they might be expected to convert existing buildings or put up silos. They would wish, however, to know plans for Government storage in the area to avoid duplication.

**46.** If the landlord is unwilling to provide the complete installation we think that the tenant should be given every encouragement to put it up himself either in full or in part. We were convinced from the evidence we received that probably the main obstacle to this step being taken by tenant farmers at the present time is shortage of capital. They have not the same resources for borrowing capital which are provided for landlords under the Lands Improvement Act and other legislation. They can obtain compensation at the end of their tenancy by obtaining either the prior consent of the landlord or the approval of the appropriate Minister under the Agricultural Holdings Act, 1948, or the Agricultural Holdings (Scotland) Act, 1949. We refer to this matter again in the course of our recommendations.

### **Seasonal Price Scales**

**47. Wheat.** Since 1941 the fixed guaranteed average price for wheat has been provided in the form of a seasonal price scale. Between 1944 and 1951 the range between the beginning and the end of the season was increased from 2s. 4d. on a starting price of 13s. 0d. per cwt. to 4s. 0d. on a starting price of 26s. 10d. per cwt. The widening of the range was designed to encourage farmers and merchants to hold at least part of their grain for disposal after the harvest period.

**48.** Rising costs during recent years have to a certain extent offset the effect of the widening of the scale but we note that a number of farmers have equipped themselves for drying and storage and that many more have used their combines carefully with the object of holding at least part of their grain on the farm without drying. This is illustrated in the increase in sales off farm in August, September and October between 1946 (when the rapid increase in the number of combines began) and 1950, from 30.7 per cent of the crop to 36.7 per cent which is a much slower rate than the increase in combines.

**49.** Unfortunately, contending against the influence of the price scale, several factors induce farmers to sell quickly. These include especially the cost of installing and operating drying plant and vermin-proof storage, and the reduction in weight of the dried grain. We feel, therefore, that if more grain is to be held over by farmers and merchants the price range should be sufficient at least to meet on average the necessary costs of drying, cleaning and storing the grain. Evidence has been submitted which suggests that the present seasonal range may be inadequate to meet these costs or to provide a sufficient inducement to farmers and merchants to extend their drying and storage facilities.

**50.** Within the seasonal range it is important for special encouragement to be given to the holding of wheat over the time of year when the marketing problem is most acute—at the same time doing nothing to induce the unloading of excessive supplies in the weeks immediately before the following harvest. The difficulties in marketing wheat are at present concentrated in a normal year within a ten-week period and if this peak could be spread instead over, say, 20 weeks until after Christmas, many of the most difficult problems would be alleviated. When the scale was widened from 3s. 6d. to 4s. 0d. for the 1951-52 marketing season the price increment for holding grain from the harvest in, say September to marketing in January was increased from 2s. 0d. to 2s. 8d. We are satisfied that this is insufficient to overcome the tendency to cash in by immediate disposal rather than to dry the grain and put it into store and we recommend that methods of providing sufficient incentive during these months to meet these costs should be examined in devising the scale for 1952-53.

#### *Oats*

**51.** For feeding oats there is for 1951-52 a seasonal range of 8d. per cwt. at the minimum and 1s. 6d. per cwt. at the maximum. In parts of Scotland oats must be regarded as a cash crop but in England and Wales practically the whole crop is retained on the farm. In both countries however, in order to preserve the straw for feeding to livestock, the crop is usually cut by binder even on farms where combines are used to harvest other grain. Oats for sale are usually threshed from the stack so that the seasonal price range is of considerably less importance than for wheat. Nevertheless, the tendency to hold oats beyond the period of the main marketing pressure would no doubt be encouraged by some further extension of the seasonal price range.

#### *Barley*

**52.** No seasonal price range for barley has been introduced. There is no maximum price for barley other than feeding barley and seeing that many barley growers aim to sell as much as possible of their crop for malting or distilling and the processors, except in Scotland, normally purchase the bulk of their supplies in the first four months after harvest, the view has been expressed that the introduction of a seasonal price range for feeding barley would have little effect on the provision of farm storage.

**53.** The opposite view is that the absence of a seasonal price scale is difficult to reconcile with the general need to spread the marketing of the grain more evenly over the year. The absence of maximum price control rules out a scale for barley for malting and distilling. We conclude that while, as in 1950 and 1951, the demand for barley for human consumption is sufficient to absorb the bulk of the supply, a seasonal price range for feeding barley would give little if any encouragement to the provision of new storage facilities.

#### **Merchants' Facilities**

**54.** Merchants' businesses have tended to grow at economic points for the handling of the grain of a district. They are, therefore, often very well placed for providing facilities needed by groups of neighbouring farmers. Many merchants already provide drying and storage facilities which in a wet season are of special value owing to their location at nodal points for the assembly of grain and we believe that there is scope for a substantial expansion of facilities at such points. Merchants are likely to be able to keep driers of, say, 2-4 tons an hour capacity in use for a longer period each year than any but the largest farmers. They can dry not only the grain

they buy, but also feeding grain to be returned to farmers for consumption on the farm. From the point of view of the ultimate user (particularly of the maltster) it is often necessary that grain should be sampled and adequately cleaned by a merchant before the bulking of local supplies for delivery to the user.

**55.** The need for additional facilities throughout the grain areas is such that there seems to be scope for all the facilities which, on present evidence, individual merchants are contemplating providing. In the immediate future, therefore, it should be possible to encourage all sound commercial proposals for the provision of drying and storage by country intermediaries, even after giving full weight to the advantages of locating facilities at the farm or the user's premises.

**56.** It was represented to us that merchants generally could not greatly expand their facilities for grain drying and storage because in present circumstances finance could not be obtained at an economic rate of interest. This matter is referred to in our recommendations.

### **Farmers' Co-operatives**

**57.** The considerations discussed in the three preceding paragraphs apply to those co-operative concerns which provide or are prepared to provide a full merchanting service and become approved buyers of grain. As with merchants, storage and drying facilities may be operated at a low cost where diversified activities permit a spread of overheads and running expenses. But without this it is doubtful whether the *ad hoc* co-operative venture can be made to pay. In this respect there is a difference between grain drying and grass drying. Grass drying can be continued for six months or more of the year and is not so much affected by the weather and *ad hoc* co-operative grass driers have therefore proved economic.

### **Farmers' Local Driers**

**58.** In areas sited too far from large central receiving houses, small units installed and worked by a group of farmers may prove useful. Some difficulty may arise in staffing as the driers are utilized for a short time and a permanent staff would hardly be justified. Efficient management and skill in their operation is also essential—without which their farmer members would lose faith. Outlying stations would be more efficiently organized if they formed branches of an established co-operative. Capital cost would be low if storage was confined to servicing the drier. (The use of prefabricated and easily dismantled buildings and equipment would be of value as these could be moved if local production trends changed.)

### **Drying and Storage by Ultimate Users**

**59.** We have already suggested that the additional drying and storage facilities which are needed should, in the main, be sited either on or near the farms or at the ultimate users' premises. We are satisfied from the evidence we have received that additional facilities of this kind are necessary in many grain-using industries.

**60.** Information provided by these industries shows that the maximum quantity of home-grown wheat which millers are at present able to take in during the ten-week period is about 550,000 tons and of this quantity about 150,000 tons can be stored. In 1950, as much as 400,000 tons was used in the grist during the ten-week period and this may be taken as the maximum usage for practical purposes. Maltsters, brewers and distillers at present have a total storage capacity of a little more than 500,000 tons

but in a normal season their intake capacity during the ten-week period is a little lower. We attach very great importance to the expansion of the intake capacity of ultimate users, wherever this is necessary to ensure that full use is made during the period of peak pressure of the drying and storage facilities which already exist. We understand that lack of capital at economic interest rates is an important factor limiting the provision of the additional facilities needed and that the present financial arrangement between the flour millers and the Ministry of Food does not give millers sufficient inducement to undertake additional capital commitments of this nature.

61. There are certain economic advantages of additional storage with accompanying drying facilities at ultimate users' premises. Facilities at these premises are more likely to be in use for a substantial proportion of the year and can be more readily used on a 24-hour basis when necessary than facilities provided elsewhere and, for this reason, the economic return for the materials, manpower and capital expended in their construction will often be greater. Moreover, the variations of the usage of grain by ultimate users from year to year are, on the whole, less than the variations in production of the home crop and the need for storage can be more accurately foreseen. Grain can often be carried direct from the farm to the users' premises and the need for additional handling and transport, which is inevitable if the grain is dried or stored at an intermediate point, can be avoided. Moreover, the majority of ultimate users store in bulk (in the case of millers to the extent of 95 per cent of the storage space) and the turn-around of sacks is quick. The scope for adding to storage at the premises of individual ultimate users must be a matter for determination by the firms concerned. The following figures suggest, however, that in certain of the using industries there is scope for the provision of additional grain storage:

		Approximate Storage Space available for Home-Grown Grain in 1951	Approximate Annual Usage of Home-Grown Grain
Flour Mills	...	150,000*	1,400,000
Maltsters	...	290,000	470,000
Brewer Maltsters	...	175,000	300,000
Distillers	...	45,000	240,000

62. Facilities for handling and storing grain in bulk are already available at many ultimate users' premises and these are sufficiently dispersed throughout the country for them often to be within reasonable proximity to farms. A further development of bulk storage at ultimate users' premises might, therefore, be an important contribution to the development of the marketing of grain in bulk, a matter to which we attach considerable importance and discuss in detail later in this Report.

63. Ultimate users are usually well placed to provide the skilled labour necessary to supervise the drying process. For example, the degree of drying required by malting barley varies considerably according to the qualities of the grain from year to year and both its drying and its storage are specialized operations requiring skilled supervision. The closer the

\* This figure is subject to some variation according to arrivals of imported wheat. It excludes the stores of Re-Commissioned Mills Ltd.

control exercised by the maltsters over these operations the more satisfactory the results are likely to be. Similar considerations apply to wheat for milling. Owing to the large throughput of many flour mills it is difficult to detect and isolate parcels of wheat that have been damaged by farm drying. In the mills there is also a possibility, within the limits set by technical considerations and by the Ministry of Food's regulation of the grist, of reducing the need for artificial drying by the admixture (as part of the normal conditioning process) of home-grown grain of moderate moisture content with dry imported grain.

### Maximum Working of Driers

64. Our inquiry of farmer owners of drying plants used in the 1950 harvest show that even in that wet season the plants were worked below their capacity. While realising the practical difficulties in extending working we attach great importance to the contribution which existing farm driers could make if operated to economic capacity, if possible on a continuous basis. We also recommend an extension of the practice of those farmers who are already using their plants to dry grain for their neighbours. The importance of this service in a wet season to the small farmers is such that we should welcome its further development and encouragement particularly by local farmers' organizations. The need for working to capacity also applies to driers off the farm : merchants' and more particularly ultimate users' driers can more readily be operated on a 24-hour basis since the total labour force is greater.

### Sack Problem

65. It is estimated that for the 1951 harvest about 14 million grain sacks were in use and this quantity appears to have been sufficient owing to the smaller grain production in 1951 than in 1950. If the harvest had been normal, however, there would certainly have been a substantial unsatisfied demand. The jute position in 1951 was such that only 1 million new 4-bushel and 1 million M.A.F. 2-bushel sacks could be made. (The M.A.F. sacks are intended to last one season only.)

66. Farmers tend to hold on to hired sacks throughout the harvest period and no substantial quantities go back to the hirers before October. Although it is true that the sacks are often used for several journeys during the period, they are also often used for storage purposes on the farm and thus the usage for transport is reduced. By October, substantial quantities are returning to the hirers and by the end of the month they can meet demands without difficulty. This concentration in demand does in fact make it uneconomic for hirers to buy sacks for the hire trade at present high prices. The present cost of sack hire for 6 months from September 1 to February 28 is 10d. per cwt., which some farmers find cheaper than bulk storage.

67. A further difficulty with sacks is that in the field the 2-bushel sack, which can easily be lifted from ground level to a lorry, is preferred, whereas off the farm, especially where mechanical handling is possible, the 4-bushel sack is better. Indeed, the contents of the 2-bushel sacks sometimes have to be transferred to 4-bushel before leaving the farm.

68. It appears very desirable for the 2-bushel sack to continue to be made since a small sack is preferable with bagger type combines. Furthermore, the loosely woven M.A.F. sack allows air to get to damp grain coming off the combine and facilitates drying on the platform drier. If the Ministry ceased to make these sacks available it would be difficult for farmers to obtain them, especially at a reasonable price. Both because of the shortage

and the cost of sacks therefore everything possible should be done to reduce the number of journeys per sack and to dispense with sacks wherever possible.

### **Bulk Handling**

69. The sack problem and the urgent need to reduce manual handling of grain leads to the conclusion that bulk handling and storage should be encouraged wherever possible. The Mission to America were very much impressed with the almost universal prevalence of bulk handling of grain both on and off the farm. It was only in the State of New York that sacks were commonly used, and even here there was a steady trend away from sacks to handling in bulk in association with the more extensive use of combine harvesters in that State.

70. The Mission reported that the use of tank combines facilitates bulk handling in the actual harvesting operations and the grain is fed into standard commercial-type trucks, most of which are not of the tipping type. These trucks convey the grain direct to the country elevators and sometimes to terminal elevators where a simple form of cradle hoist is used to lift the lorry by the front wheels to allow gravity discharge of the grain into ground level pits or intake hoppers. Two other items which are commonly used in America and would appear to be of great assistance in facilitating bulk handling on the farm and at later stages are the portable auger which can reduce the expenditure on conveying plant and the lightweight aluminium shovel which reduces the fatigue involved in completing the emptying of flat-bottomed bins and of lorries.

71. The Mission were so impressed with the advantages and economies of bulk handling that they recommended a concerted effort to encourage the gradual adoption of co-ordinated bulk handling of grain in this country. We agree that dealing with the grain harvest in bulk can eventually effect economies by reducing handling and sack usage and the storage space needed. It is clear, however, that movement of grain in bulk from the field must not proceed faster than the drying plant can absorb it, and it may well be that the initial effort in the development of the bulk handling of grain in this country should be concentrated on grain conveyed from driers (whether farmer, merchant or Government units) to the ultimate user. The operators of driers will be in a better position to provide bulk loads and the simple additional bulk loading facilities needed. We recommend therefore that all parties concerned, namely, farmers, merchants, millers, maltsters and transport interests should be invited to discuss the steps necessary to secure the development of bulk handling as a practical proposition.

72. As an illustration of steps already taken it appears that the Railway Executive have already had in regular use each year some 500 specially-constructed wagons for the conveyance of grain in bulk, and the British Road Services and some ultimate users have also been experimenting with special types of road wagons. American practice, however, as revealed by the Mission, shows that ordinary lorries and standard covered wagons on the railways can readily be adapted for bulk transport of grain, and it may be that this practice will obviate the need for special wagons and vehicles for this purpose.

73. Bulk handling is not, of course, without its risks, and it will be necessary to impress upon farmers and others the importance of avoiding the long distance conveyance of grain in bulk unless it is reasonably dry. Experience shows that there is more risk of damage by mould and over-heating where damp grain is handled in bulk than when it is put into sacks.

## Moisture Testing

74. In the evidence we have received and in our study of the American Mission's report we have been impressed by the importance, both for combining and drying, of accurate knowledge of the moisture content of the grain. For use on farms a simple, reliable, and not too expensive moisture meter is required and the National Institute of Agricultural Engineering is arranging for the existing types both here and abroad to be examined from the point of view of suitability for farm use. Not all farmers will acquire their own moisture meter. Many are already advised by their merchants whether their grain is ready for combining. We recommend assistance to farmers, where it is not already provided, as follows:

- (a) by merchants placing their testing facilities at farmers' disposal, and
- (b) by the National Agricultural Advisory Service taking samples and advising farmers in other ways *during the harvest* on the importance of choosing the right day and time of day for combining.

## Technical Investigations

75. There are a number of technical points which deserve further investigation and we recommend that the Technical Panel set up under the chairmanship of the Director of the National Institute of Agricultural Engineering should be invited to continue their investigations, particularly on such questions as farm drying and storage and on moisture testing.

## Financial Assistance and Building Licences

76. In an interim report submitted to the Food and Agriculture Departments in August, 1951, we recommended that preliminary consideration should be given to the following :

- (a) The Departments concerned should provide help for the construction of approved buildings, and installation of machinery and plant connected with the drying, cleaning and storing of grain by loans at a reasonable rate of interest.
- (b) A high degree of preference, in the issue of building licences (and allocation of starting dates), and in the provision of steel and other materials, should be given to approved buildings, machinery and plant required for the drying, cleaning and storing of grain ;
- (c) There should be a special rate of tax allowance for depreciation for buildings erected for grain storage or drying.

The further consideration which we have given to the subject confirms our view that Government assistance on these lines is urgently required in the national interest, as distinct from any desire for special benefits by any sectional interests concerned. We note that in the United States loans are available to farmers and co-operatives for the erection of grain storage, while grain merchants and other intermediaries have also been able to obtain assistance in the launching of approved projects. It has been suggested to us that ultimate users and country merchants, who are prepared to provide additional facilities for the drying and storage of grain should be given equal treatment with farmers in the allowance of 10 per cent per annum by way of depreciation for income tax purposes on buildings, and in the waiver of development charges. We commend this proposal for further consideration.

# SUMMARY AND RECOMMENDATIONS

## Part I. The Size of the Problem

(1) Our task was to compare the quantity of combined grain likely to come forward in the future with the facilities for handling it. Our basis was the 1950 harvest, which was just completed when we began our enquiries, but we have also taken account of the disposal of grain from the 1951 harvest up to the end of 1951.

(2) We obtained detailed estimates from the trade, of drying and storage facilities existing and planned on merchants' and ultimate users' premises. Agricultural conditions make the corresponding figures for farms much less exact.

(3) In recent years combine harvesters have been bought at the rate of about 3,000 a year. Hitherto few of these have been replacements. Total numbers of combine harvesters in use will continue increasing but probably at a diminishing rate. Meanwhile farm drying and storage equipment is not keeping pace with the increase in harvesting machines. Few farmers are installing complete plants of the conventional types, although many are showing interest in the development of the less expensive types. In general, although more grain is being retained on farms for feeding, farmers tend to cash in as soon as possible on that part of their crop which is intended for sale.

(4) The maximum use of home-grown wheat at harvest time that is practicable in flour production in present circumstances was reached in 1950. Storage by flour millers was also nearly at its limit. Maltsters, brewers and distillers absorbed barley almost up to their maximum capacity in 1950 and fully so in 1951.

(5) Ministry of Food storage space was fully used in 1950 but not entirely so in 1951.

(6) About 2,100,000 tons of threshed grain was produced in the ten weeks of the 1950 harvest. Of this about 600,000 tons (about half of which was not dried) remained on the farms at mid-October. The weather slowed down the rate of combining, and eased the disposal problem.

(7) Conditions in 1951 reduced the acreage cut per machine to an extent which roughly cancelled the effect of the increased number of combines. Two factors noticed, the tendency to buy a reserve combine and the tendency to cut part of the acreage by binder for the sake of the straw, may well prove continuing features.

(8) For the future, labour difficulties will be a dominating factor and, given a cereal acreage at least equal to 1950 and weather conditions permitting continuous working, the acreage cut per combine is likely to be higher. Should this happen in 1952, with due allowance for the additional grain which merchants, users and others estimate they will be able to handle during that harvest, farmers may have to hold after harvest up to 900,000 tons *more than in 1950*. More grain could be held without serious loss as 1951 has shown and some provision is being made on farms, but an additional quantity of this order could not be satisfactorily held judging by the rate at which combines are outstripping driers.

(9) No exact forecast can be made for a particular year, but there is a risk of a big deficiency of facilities in 1952, a still greater risk if it is postponed until 1953, and so on. Action is therefore required to increase drying and storage facilities substantially over those now planned.

## Part II. Remedies

(10) In view of rising labour costs we assume for the purpose of this Report that farmers will be free to purchase combines.

(11) The size of the problem is such that a combined effort is required by (a) farmers, (b) merchants and other intermediaries, and (c) ultimate users, to provide for the increasing quantities of combined grain coming forward immediately after harvest.

(12) In order to avoid double handling, placing storage and drying plant at the farm or at ultimate users' premises is generally preferable to placing them at intermediate points, except where these are in the growing area and grain can be taken straight from the combine.

(13) Extension of Government storage is not recommended. The National silos are intermediaries and single-purpose enterprises with a seasonal use only. Private operators should be told that the field is to be left to them.

(14) The railways have so far coped with the grain coming forward at harvest but not without difficulty and at the cost of considerable local traffic congestion. The extent to which the use of road transport can develop depends on the regularity of the flow from farms.

(15) Drying and storage on the farm makes for the economic use of transport facilities through regular marketing, prevents deterioration of grain during transport, and is desirable on defence grounds. Farm drying must be in skilled hands if the inherent milling, malting or seed qualities of the grain are to be maintained.

(16) More publicity is needed for the types of farm drying cleaning and storage units available. Existing buildings can often be used and possibly, in the drier areas, concrete silos in the open. Removal of weeds and other extraneous matter from grain is important to increase the efficiency of driers.

(17) More demonstrations of the methods and techniques now available on a local and possibly a national scale should be held.

(18) In so far as permanent buildings are required, landowners would welcome (a) an assurance on the future of arable farming, whether on its present or a larger scale, and the future intention as to Government grain storage, and (b) more advantageous terms of tax relief. Where landowners are unwilling to embark on expenditure tenants should be encouraged to do so. **We recommend** provision for tenant farmers of some means of borrowing capital similar to the facilities available to landlords from the Lands Improvement Company and the Agricultural Mortgage Corporation.

(19) Evidence suggests that the present annual range of the seasonal price scale for wheat may provide an inadequate inducement to farmers to instal and operate drying and storage plants. In particular the price increment for holding grain from harvest to the following January is insufficient and we consider much of the problem could be solved by spreading the marketing peak over this longer period. **We recommend** consideration of providing an incentive to farmers and others to instal facilities by an adjustment of the price range with special reference to the period mentioned.

(20) There may be advantages in widening the seasonal scale for oats.

(21) A seasonal price scale for barley would be possible only at feeding price levels and in the present marketing situation the influence of such a scale on the provision of storage etc. would be negligible.

(22) Merchants' premises are generally well situated to handle farmers' grain and therefore can often provide drying and storage space economically—drying grain for return to farmers as well as grain for sale. In addition they can provide cleaning, sampling and bulking services. *Any sound proposals to extend these facilities should be encouraged.*

(23) Farmers' co-operatives have similar economic advantages where they are able to provide a merchanting service and engage in a diversified trade. The *ad hoc* co-operative grain drying enterprise is a rather uncertain venture. But in remote areas, groups of farmers might successfully run collective drying plants provided that skilled managers and operators can be found.

(24) It would be to the national advantage if grain-using industries were to add to their drying and storage facilities for home-grown grain wherever possible. Millers, maltsters and others can make the most efficient use of storage and drying plant through continuous use of driers, skilled supervision and storage in bulk.

(25) Much grain drying plant especially on farms is being used below capacity. Every encouragement should be given to farmers to dry grain for their neighbours. All interests should make efforts to ensure that grain drying plant is used as nearly continuously as possible at the peak period.

(26) The supply and cost of sacks is creating an increasingly serious problem. Two-bushel sacks will continue to be needed. All practical steps should be taken to increase the number of journeys per sack.

(27) Bulk handling of grain would reduce use of sacks and must eventually economize in handling and storage costs. An E.C.A. mission to the U.S.A. (July 1951) has examined the application to our conditions of American methods. **We recommend** that all interests should be invited to discuss the practical steps necessary to develop bulk handling as a co-ordinated process—concentrating in the first instance on the movement from drying plants to users' premises and bearing in mind the greater risk of deterioration of bulked grain. Those erecting new driers should bear in mind this probable development.

(28) The practice of testing grain for moisture both *before* and after cutting should be extended. **We recommend** an expansion of testing services for farmers by merchants and advisory staffs.

(29) **We recommend** continued investigations by a Technical Panel into drying and storage problems.

(30) In view of the paramount importance of preventing damage to the nation's food supply, we recommend (a) assistance by loans at reasonable rates for the erection of storage, drying and cleaning plant by farmers, merchants and ultimate users; (b) a high degree of preference in the issue of building licences and allocation of materials for those purposes; and (c) a special rate of depreciation for Income Tax purposes, allowing merchants and users the same rate as farmers and similar treatment as to waiver of development charges.

Signed:

*Reginald Franklin* (Chairman)

*F. A. Bean*

*W. H. Cashmore*

*J. W. F. Causton*

*H. Falconer*

*A. E. T. Farquharson*

*R. Farquharson*

*Gretton*

*S. H. Hastie*

*G. O. Hoskins*

*H. G. Lambert*

*C. A. Loombe*

*H. P. Lord*

*G. Page*

*T. F. Skilton*

*H. B. Watkins*

*G. H. C. Amos* }  
*A. Lawrence* } Joint Secretaries

*Jean Parker*, Assistant Secretary

15th January, 1952

ESTIMATES OF GRAIN CUT BY  
COMBINE HARVESTER

## GREAT BRITAIN

1 Year	2 Nos. in use	3 Average foot cut per machine	4 Average acreage per foot cut	5 Total acreage combined	6 Average yield per acre	7 Tonnage combined
1950	13,500	8.2	18½(a)	000 acres 2,000	cwt. 19	000 tons 1,900
1951	17,000	8.2	15(b)	2,000(a)	19	1,900
1952	19,500	8.0	15-20(c)	2,300-3,100	19-20(a)	2,200-3,100

## Sources of Information

Col. 2. The Machinery Census of January 1950 giving numbers of serviceable machines on farms in Great Britain at that date supplemented by estimates prepared after discussion with the manufacturers and the National Farmers' Union of the probable additional machines in use by the 1950, and 1952 harvests.

Col. 3. Based on an analysis of past and expected supplies of machines (home produced and imported).

Col. 4. (a) Based on a limited survey of actual practice in the 1950 harvest when weather conditions slowed up combining.

(b) Not based on an inquiry but on the general view that the average was substantially lower than in 1950.

(c) A range has been used for the reasons outlined in Para. 5 of the report.

Col. 5 = Col. 2  $\times$  3  $\div$  4 but (a) has been reduced slightly to allow for shortfall in acreage owing to weather conditions.

Col. 6. The estimated 5 year average yield ending 1950 is wheat 19.5 cwt. per acre, barley 18.3, oats 16.7. Of combined grain about 45 per cent is wheat, 45 per cent barley, 10 per cent oats. The average is therefore 18.7 approximately. Yields are however tending to rise and the average might be 1 ton per acre in future. (1950 and 1951 are yields for those years in the same proportions.)

Col. 7 = Col. 5  $\times$  6.

SUMMARY OF DISPOSAL OF GRAIN FOR FIRST TEN WEEKS OF HARVEST  
(FROM ABOUT EARLY AUGUST TO LATE OCTOBER)

	(000 tons)			
	1951	1952		
1. Combined add threshed in field or from stack	1,900	1,900	<i>Rough</i> <i>forage</i>	<i>100</i>
	200	300	2,200	200
2. Total grain dealt with (or to store on farm)	<u>2,100</u>	<u>2,200</u>		
				<u>2,300-3,300</u>
3. Processors' intake	530	Wheat	Barley	Oats
4. Ministry of Food	125	480	525	90
5. Merchants	145	20	—	—
6. Transit	15	100	65	—
7. Taken off farms	815	100	90	15
		115	15	15
TOTAL	1,530		650	105
8. Estimated held on farm, 2, minus 7 ...			920	750
			1,370	1,800
				Total left on farmers' hands at end of period
				500-1,500
				600
				9. Amt. held in 1950 ...
				10. Deficiency compared with 1950 ... up to 900
				... ...
				say 850
				say 600

\* In certain circumstances this may be increased by 100, see Para. 18.

N.B. (i) In estimating total grain to be dealt with in 2, we have taken a wide range of conditions as shown in Table 1. In estimating the resulting problem at 10, we have assumed 1951 holdings of grain were exceptional and that farm facilities remain approximately as in 1950.  
(ii) 7 are actual approved buyers receipts for 1950 and 1951, maximum possible offtake for 1952.

## TECHNICAL NOTES ON FARM DRYING AND STORAGE

### Cost of Installation

Now that the general principles of drying grain are more widely known it is possible to design a wide range of lay-outs to meet individual farm requirements. In some cases, recent developments have not yet resulted in standard designs, and the efficiency and initial cost for a given capacity varies widely. In cases where existing buildings are suitable for housing the installation there is considerable saving in capital outlay. Other factors which influence cost are size and shape of silos or bins, general layout and whether farm or outside labour is used.

For any given grain acreage the particular type of installation required varies according to the percentages of grain sold (1) at harvest time, (2) after short-term storage, and (3) after long-term storage.

Drying, air drying and storage installations have been designed for dealing efficiently with as little as 60 tons, as well as large scale installations for over 400 tons per annum. The initial costs range from £400 to over £10,000.

Installations with standard continuous flow vertical-type driers and silo storage, or silo storage with combined drying and ventilation cost up to £70 per ton capacity, and require about 4 tons of steel for 100 ton capacity. Dual-purpose grass and grain drying plants have an initial price about 40 per cent higher and use nearly double the amount of steel on the grain capacity basis.

The initial cost of £30 per ton of storage with drying facilities is based on the assumption that the installation is built with its own covering building, erected by outside labour, and is equipped with a pneumatic conveying system.

### Special Plants

Three recent developments in farm drying installations may have an important bearing on future trends.

- A platform-type drier on which 40-50 one-cwt. sacks are dried in a batch. The sacks are placed over grids in a platform and warmed air from any suitable heater is forced through the sacks. In its most simple form it is installed in an existing barn without provision for bulk storage, at an overall cost of little over £400. The general dimensions of the platform have been standardized, and there is little chance of error in construction. If required bulk storage can be combined with this type of drier, and it can also be used for barn hay curing at practically no extra cost. A plant capable of drying 200 tons, with bulk storage for 50 tons, requires about 1 ton of steel.
- A method in which the grain is dried during storage in silos or in bins. Slightly warmed air is forced up through a depth of grain and the grain dries slowly from the bottom upwards. The capacities of existing plants range from 60-400 tons. Although the present cost is similar to that of standard driers with ordinary bulk storage, modern tendencies are moving towards more compact layouts, giving a saving in materials and coverage as well as making it possible to use more simple grain conveyors.

These tendencies will reduce, somewhat, the present initial cost where it is considered sound policy to erect a single-purpose building: on the other hand standard Dutch barns with circular section precast silos and a pneumatic conveying system offers greater flexibility both as regards extensions and alternate uses. The advantages of this type of installation are low labour requirements and freedom of risk from damage, provided the design is sound and the correct technique is understood.

An alternative to the warm air ventilation drying is a method in which air, pre-dried by passing it through silica gel, is used instead of heated air. In one application the grain is dried in a specially constructed bin, which may be 18 feet or more deep. The bin is, in principle, a drier, and the grain may be stored afterwards in normal unventilated silos. Chemically dried air offers advantages such as freedom from risk of damage, low running costs, etc. Its future will depend on ease of control and initial cost, but both the methods of air treatment and the idea of using a single bin as a drier, rather than the more lengthy drying in a series of bins, is quite interesting.

(c) A floor-type grain drying equipment in which air is supplied to a network of metal ducts arranged on a barn floor. In one example the plant covers a floor area of 40 ft.  $\times$  20 ft. to give storage capacity of approximately 100 tons. Its success will depend largely on finding an efficient means of moving the grain after storage without using excessive labour.

### Outside Grain Storage on Farms

Up to the present very few grain silos have been erected in the open. The practice of placing them inside takes up valuable covered floor space and adds to the cost of the farm installation.

Satisfactory outside storage *might* be possible in several ways, including the following:

(a) Concrete silos fitted with conical or domed metal or plywood timber roof caps. It might be necessary to seal the joint between the individual slabs with some flexible medium. It might even be advisable to redesign the concrete slabs. Another consideration for such silos would be the application of waterproof compound on the outside of the silo.

(b) Metal silos—such as used in Australia and the U.S.A.

### Temporary Bulk Storage

In cases where it is required to store grain in bulk for up to 8-10 weeks after harvest, the cost of a standard installation cannot be justified. It is possible that some form of silo which could easily be dismantled would be the solution. The N.I.A.E. is giving a trial to a flexible fabric silo imported from France to see if it has possibilities for temporary bulk storage.

It is not possible to make any definite recommendations on the above ideas until experimental work has been carried out particularly on the outside silos.

## SOURCES OF INFORMATION

Oral or written evidence has been received from the following:

The Agricultural Co-operative Association Limited

The British Agricultural Contractors' Association

The Chartered Auctioneers' and Estate Agents' Institute

The Country Landowners' Association

The Land Agents' Society

The National Association of Corn and Agricultural Merchants

The National Farmers' Union of England and Wales

The National Farmers' Union of Scotland

The Oatmeal Millers' Association of England and Wales

The Scottish Oatmeal Millers' Association

The Railway Executive

The Road Haulage Executive

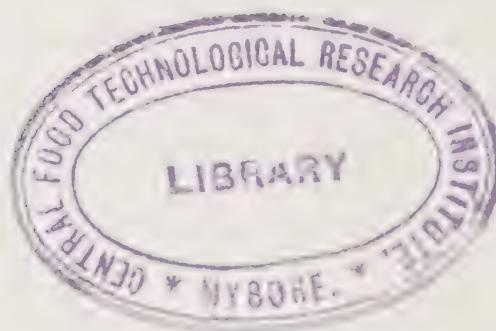
The Road Haulage Association Limited

The Royal Institution of Chartered Surveyors

The Scottish Landowners' Federation

The West of England Group of Sack Contractors

Statistical and other information was also provided by the Agricultural Engineers Association and by many individual firms and farmers which greatly assisted the Working Party's inquiries into present practice and future development.





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